

(PATENT)

REMARKS/ARGUMENTS

The Examiner has deemed the restriction requirement FINAL. Therefore claims 1-11 are currently pending and claims 12-19 are withdrawn. Applicant respectfully requests the examiner rejoin (according to MPEP §806) claims 12-19 directed to the process of making (Group II) and apparatus using (Group III & IV) the micropump of Group I when the Examiner finds allowable subject matter. New claim 20 has been added.

Applicant has added the word “different from atmospheric pressure” to claim 1. This is not a change of scope, but merely intended to clarify that the preset internal pressure is not the same as atmospheric pressure, as described throughout the specification, and therefore, can more accurately be characterized as a “preset internal pressure different from atmospheric pressure.”

Amendments to the Drawings

The Examiner has requested amendments to the drawings because “parts in section are not hatched and parts in elevation are not shaded.” Figures 1-5, 10, 13-18 and 20 are structural drawings. Figures 6, 7, 8, 9, 11, 12 are electronic diagrams and do not require shading or crosshatch. Figure 1 has recessed areas at 7, 8, and 9 as shown in the 3 dimensional drawing. Figures 3, 4, 5, 10, 13-18 and 20 are cross-sections of the entire device and would be obscured by crosshatching. Figures 3 and 5 have been amended to label the membrane 35. Applicant respectfully requests the Examiner specify further revisions to the drawings if additional amendments are deemed necessary.

Ahn Does Not Use a “built-in pressure”

Claims 1, 4, 6, 8 and 11 are rejected under 35 USC § 102(b) as anticipated by Ahn (U.S. Pat. No. 6,116,863). Ahn teaches an electromechanical pump actuator 30 with inlet and outlet valves that are alternately operated. The pump actuator 30 includes a membrane 55 and an electromagnetic arrangement configured to displace the membrane 55 in opposite direction, thereby **generating** a pressure in the chamber 55. The pressure differential in Ahn is **generated** by the alternate motion of the membrane 55.

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The present invention, in contrast, uses a “plurality of fluid-tight chambers ... having a **preset internal pressure different from atmospheric pressure.**” The difference in pressure **already exists** (e.g., is “preset”), needing only opening a fluidic connection to the chamber to pump fluid. The present invention does not require any mechanical moving elements to **generate** pressure. Therefore the present invention having a “plurality of fluid-tight chambers ... having a **preset internal pressure different from atmospheric pressure**” is simpler to manufacture, more reliable, and smaller than the pump described by Ahn.

Therefore, the cited art does not teach each claimed element and the invention is not anticipated.

Ahn Does Not “melt electrodes”

The Examiner rejects claim 11 as anticipated under 35 USC § 102 because “the current source of Ahn is **presumed** to be capable of supplying sufficient current to melt the electrodes...” However, Ahn requires **intact** electrodes to manipulate the electromechanical valves, thus generating a pressure differential. Ahn could not supply a current “that melts said electrodes” because the electromechanical pump **would not function** if the delicate membranes were destroyed.

In contrast, the present invention uses a supply current “that melts said electrodes” to allow the pump to access the **preset** internal pressure differential to pump fluids. Once the electrode are melted, the pressure differential is released from one or more “fluid-tight chambers” thus pumping fluid.

Therefore, the cited art does not teach each claimed element and the invention is not anticipated.

Ahn requires different membrane properties

Claim 5 is rejected as obvious under 35 USC § 103 over Ahn because no unexpected result is expected with a thickness of less than 1 μm . If a moveable membrane were being generated as described in Ahn, a membrane thickness of less than 1 μm might be detrimental

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because the membrane would be **too weak to be moveable**. Additionally, the microfluidic pump in Ahn **would not function** if the membranes melted. In the present invention the electrode and membrane are melted to release the preset pressure from the fluid-tight chambers. Although the 1 μ m membrane thickness is only described as one preferred embodiment, the reduced thickness allows the electrode to melt the entire membrane rapidly.

Therefore, the cited art does not teach each claimed element and a prima facie case of obviousness is not made. Further, the cited art actually requires a more stable membrane than the invention, needing to be sufficiently strong to withstand repeated actuation by movement. Thus, the cited art actually **teaches away** from the 1 μ m membranes of the invention.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue. Applicant respectfully requests the Examiner contact the undersigned if there are any questions. No fees are believed to be due for this submission. However, should there be any additional fees required, please charge such additional fees to Deposit Account No. 50-3420, under Order No. 31175803-005001 (Valoir).

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Respectfully submitted,

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